

## A CHAIR

### Field of the Invention

The present invention relates to chairs and, in particular, to a chair which actively supports good posture.

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### Background of the Invention

The human body is not well designed for sitting for prolonged periods, yet modern work patterns and lifestyles require us to do just that. When seated, most of the body weight is supported on two pointed bones which form the base of the pelvis. These bones are known as the ischial tuberosities. In the seated state, the pelvis is inherently 10 unstable - it is rather like a triangle balanced on its point.

When seated, the weight of the body trunk, supported by the spine, tends to rotate the pelvis backwards, pushing the spine into a c-shaped curve known as kyphosis. The buttocks then tend to slide forward on the seat, reinforcing the c-curve in the spine.

If the spine is in kyphosis, pressures within the discs of the spine increase very 15 markedly, which will lead to degenerative changes over time, potentially causing severe pain. In addition, with the spine in kyphosis, the rib cage cannot readily expand, nor can the diaphragm move downwards fully. Hence, respiratory efficiency is greatly reduced, which in turn affects many body functions dependent upon blood oxygen levels.

Good posture is important because it minimises the risk of back pain and 20 improves respiratory efficiency. Various approaches to chair design have been adopted with the aim of encouraging correct seating posture.

These existing designs include the "kneel" chair, popular in the 1970's and 25 1980's, which supports the buttocks on a surface inclined forward at approximately 30 degrees and prevents the user sliding forward by taking part of the body weight on a knee pad in front of and below the main seating surface. This chair attempts to encourage sound posture initially, but imposes significant load on the knees, which can lead to pain

over time. In addition, because no support is provided for the trunk, the user's muscles are constantly in use to stabilise the trunk, which can lead to fatigue over time.

5 A further example is the "Bambach" saddle chair, which provides a seat member most readily described as a cross between a horse saddle and a bicycle saddle. The user sits astride the seat member. A back support is provided as an option. Like any saddle, this type of seat member causes pressure and chafing and is uncomfortable for females wearing a skirt in particular.

10 Australian Patent Application No. 73415/87 discloses the "Dual Density" chair. This chair seeks to prevent the pelvis rotating and sliding forward by allowing the ischial tuberosities to become embedded in a soft rear section of the seat cushion and attempts to prevent forward movement by providing a firmer material at the front of the seat, creating a transverse discontinuity, or "split" across the seat. This chair has the disadvantage that the firmer front section of the seat is uncomfortable and exerts pressure on the back of the user's thighs, with possible impedance of peripheral blood circulation in that area.

15 Further, Australian Patent Application No. 29072/99 discloses the "Soft Cell" chair. This chair seeks to address the disadvantage of the dual density seat in circulatory terms. This is attempted by making the chair seat softer at the front and harder at the back of the seat surface. This chair does not support good posture and performs no differently to a standard foam seat cushion in ergonomic terms.

20 Another chair design is the "Nottingham" chair, which is designed to allow seating over a wide range of working heights, to allow users of varying stature to address a range of working surface heights comfortably. It attempts to address the issue of spinal stability and correct postural curvature by opening up the angle between the trunk and thighs by encouraging the user to adopt a higher seat height.

25 Lastly, the "Kneeshaw" chair, seeks to maintain pelvic (and hence spinal) alignment by lodging the ischial tuberosities in a depression at the rear edge of the seat cushion.

Accordingly, there is a need to provide a chair that provides good posture and user comfort without the disadvantages of load or pressure on inappropriate areas of the

body, such as knees or thighs, and does not include complex upholstery configurations, such as those which may pose hygiene problems by the accumulation of dirt, for example.

The above statements regarding prior disclosures are not to be taken to be admissions of what was well known in the field of chairs.

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### **Object of the Invention**

It is an object of the present invention to overcome or ameliorate some of the disadvantages of the prior art, or at least to provide a useful alternative.

### **Summary of the Invention**

There is firstly disclosed herein a chair, including a seat, wherein the seat 10 includes a barrier zone dividing said seat into a front seat portion and a rear seat portion, said rear seat portion being of a material more easily deformed than said barrier zone, such that in use, movement of a user's buttocks from said rear seat portion towards said front seat portion urges the rear seat portion towards said barrier zone, deforming said rear seat portion and inhibiting said buttocks from moving towards said front seat portion.

15 Preferably, said barrier zone is of a material having a higher density than said rear seat portion material.

Preferably, said front and rear seat portions are of the same density.

Preferably, said barrier zone is located between 25% to 60% along a length of said seat when measured from a back edge of said seat to a front edge of said seat.

20 Preferably, said barrier zone is a ridge extending longitudinally completely across a width of said seat.

Preferably, said barrier zone is a ridge extending longitudinally partially across a width of said seat.

Preferably, said barrier zone is a moulded part of said seat.

25 Preferably, said barrier zone is 40 to 100 mm wide.

Preferably, said barrier zone is located below a top surface of said seat.

### **Brief Description of the Drawings**

A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, wherein:

5. Figures 1 and 2 show seats of embodiments of the present invention; and

Figure 3 shows a skeletal structure of a human when sitting on the seat of Figure 2.

### **Detailed Description of the Preferred Embodiments**

In the accompanying drawings, there is schematically depicted a chair 1 including a seat 5 including a barrier zone 10 dividing the seat 5 into a front seat portion 15 and a rear seat portion 20. The rear seat portion 20 being of a material more easily deformed than the barrier zone 10, such that in use, movement of a user's buttocks from the rear seat portion 20 towards the front seat portion 15 urges the rear seat portion 20 towards the barrier zone 10 deforming the rear seat portion 20 and inhibiting the buttocks from moving towards the front seat portion 15.

The barrier zone 10 or "speed bump" should be of a material having a higher density than the material of the front and rear seat portions 15,20. The barrier zone 10 is a ridge which extends longitudinally, either completely or partially across the width of the seat 5. In the preferred form, the ridge 10 would be approximately 40 to 100 mm wide and located between 25 to 60 percent along the length of the seat 5 when measured from the back edge 22 of the seat 5 to the front edge 23 of the seat 5. It is also possible that the ridge 10 be integrally formed or a moulded part of the base 25 of the seat 5.

This configuration advantageously promotes good posture and user comfort without the disadvantages of load or pressure on inappropriate areas of the body such as 25 knees or thighs and without the need for complex upholstery configurations which increase manufacturing costs, complexity of construction and can pose a potential hygiene problem by trapping dirt and other unwanted materials. The chair 1 takes into

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consideration the complex relationship between correct function, user comfort, bump shape, bump density relative to cushion density, and bump height relative to the height of the cushion.

As best shown in Figures 1 and 2, the speed bump 10 lies below a top surface 40 of the seat 5 allowing good pressure distribution in normal seating position. It is preferred that the material of the front and rear seat portions 15,20 are of the same density and integrally formed. This material could be polyurethane foam. However, any suitable material can be used. It is also conceived that the seat 5 could be adjustable to accommodate the requirements and body type of different users.

In use and as best seen in Figure 3, when seated, the user's buttocks and ischial tuberosities compress the material such as foam, in the rear seat portion 20. If the user begins to slide forward (into a poor posture position) the speed bump 10 causes a rapid increase in the density of that foam preventing any further forward slide. As the increase in density is less comfortable, the user will naturally tend to move to the back edge 22 of the seat 5 further improving pelvic and spinal alignment.

The chair 1 should further include a properly supportive backrest 35 which encourages slight lordosis of the lumbar spine (the apex of lumbar support should be located at the L4 vertebrae) and slight kyphosis of the thoracic spine leading to what is known as the "neutral" spine alignment. The ideal backrest design should also discourage side bent posture and a pelvic stability by encouraging closure of the sacro-iliac joint.

Although the invention has been described with reference to specific examples, it would be appreciated by those skilled in the art that the invention may be embodied in many other forms.